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"To purify rain water contaminated with chloride of lead from salt spray resting in the leads of structures, put a small quantity of pulverized chalk or whiting into the cistern and stir well after each rain."

Here are regulations concerning cases analogous to the one here reported.

CONCLUSIONS.

It is the opinion of the writer, after carefully reviewing all of the foregoing facts, that the flashing on the roof of the hatchery buildings, from which rain water is collected and then used for drinking purposes, is the source of the lead found in the water under investigation.

RECOMMENDATIONS.

It is recommended that the Public Health Service advise against the use of lead in the construction of roofs, the drainage from which is to be used for drinking purposes.

EFFICIENCY OF VARIOUS KINDS OF VENTILATING DUCTS.

A Study of the Uniformity of Air Distribution Attained with Ventilating Ducts of Various Designs.

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INTRODUCTION.

The Second Report of the English Departmental Committee Appointed to Enquire into the Ventilation of Factories and Workshops (London, 1907) presented highly suggestive researches on the effect of the design of ventilating ducts upon the uniformity of air distribution. The studies of the committee demonstrated that it is difficult to secure good distribution with branch ducts constructed at right angles to the main duct, but that it is easy, by inclining the branch ducts at an angle of 30° , to attain a fairly uniform air flow at all points. Another point brought out by these English experiments—the influence of tapered as compared with untapered main ducts—appears to have attracted less general notice. In regard to exhaust ducts, the appendix to the second report of the departmental committee states that "the effect of substituting a tapered for a uniform parallel-sided main duct was always to exaggerate the difference in air flow through the different branch ducts or openings. For example, the currents through ducts A and D were as 1 to $1\frac{1}{2}$ with the uniform air duct, but as 1 to 2 with the tapering air duct. A main exhaust air duct tapering toward the far end is thus not merely of no use in helping to equalize the flow through the branch air

ducts, but its influence, if any, is distinctly harmful, as might, indeed, have been predicted on purely theoretical grounds."

With plenum supply ducts and branch ducts set at right angles to the main duct, a tapered main duct gave better results than a straight-sided main duct, as, with the untapered main duct and right angled branches, the outlets near the fan showed a relatively low air velocity; but with properly designed branch outlets inclined at an angle of 30° the straight-sided main duct was again better than a tapered duct.

It seems probable that the original reason for tapering the main ducts in a system of exhaust or plenum ventilation was to save material. However, there has gradually grown up among ventilating engineers a feeling that tapering is essential for good distribution. As stated in the English report, "It has come, however, to be commonly considered that the real essential of success in obtaining a uniform flow of air is the tapered form of the main duct." In practice we often find main ducts elaborately tapered when the extra cost of workmanship must more than balance the saving in materials. There appeared, therefore, to be good reason for repeating the work of the English investigators to determine on a somewhat more exhaustive scale the true efficiency of straight-sided and tapered ducts from the standpoint of distribution; and the study here reported was planned with that end in view.

DESCRIPTION OF EXPERIMENTAL PLANT.

The experimental plant, as shown in Figure 1, consisted of two ducts, a tapered and an untapered one. Both main ducts were 22 feet 10 inches long and were placed side by side on wooden supports. At the upper end they were joined by a Y branch, at which point a damper was so placed that the air could be shut off from either duct at will. The single leg of the Y was connected by means of a tube 6 feet long to a 45-inch steel plate planing-mill fan arranged so as to blow air into the ducts. The fan was driven by a constant speed electric motor. Proper control apparatus was provided by means of which the motor speed could be varied at will. It will be observed from the figure that each duct was 1 foot $4\frac{7}{8}$ inches square at its beginning, the tapered duct being finally reduced to 6 inches square at the further end. Both main ducts were provided with six branch pipes, five on the side and one at the far end (numbered 1-6 on plan, Figure 1). In designing the tapered duct, the plan was to provide a main duct of cross sectional area, 25 per cent in excess of the sum of the branch areas from any point to the end of the duct. All of the branch pipes were 6 by 6 inches in cross section and entered the main duct at an angle of 30° . Ports were also placed at five points in the

side of the duct for the study of direct discharge (or exhaust) without slanting branch ducts (lettered A-F in Figure 1). At the upper end of each duct there was also placed a large handhole 8 by 12 inches, as shown. All of the branch pipes, the ports, and the handhole were provided with sliding dampers. All joints in the ducts, branches, and dampers were designed and constructed with care so as to insure the apparatus being air-tight.

In the third and fourth series of experiments reported below, the straight leg of the Y originally connecting with the discharge outlet of the fan was connected, instead, to the inlet of the fan by an S-shaped bend so that the apparatus could be used as an exhaust system.

METHOD OF MAKING OBSERVATIONS.

The apparatus was adjusted for making observations by closing the ports and the handhole on the duct under observation, and fully opening the dampers on its branch pipes or by closing the dampers on branch pipes and leaving the lateral ports in the main duct open. The motor speed was then set and the damper between the two main ducts was so adjusted as to give the desired average velocity. The velocity of discharge (or exhaust) was determined by means of a 4-inch amemometer, calibrated at the Bureau of Standards at Washington. A stop watch reading directly to 0.2 second was used for determining the time. The amemometer was placed in the opening of the branch pipe or in the lateral port, as the case might be. The stop watch was started when the amemometer registered zero, and the amemometer continued registering until the stop watch showed that one minute had elapsed. In this manner two check observations of one minute each were made of the velocity at each successive branch pipe; and each figure presented in the tables to follow represents the average of two such readings.

RESULTS OF AIR SUPPLY STUDIES WITH SLANTING BRANCH DUCTS.

Sixteen tests were made with the straight duct and 16 tests with the tapered duct, involving, in all, 192 velocity measurements, the slanting branch ducts being open in all cases and the side ports of the main ducts closed. The results are presented in compact form in Table I. The individual tests have been grouped under four headings according to the mean velocity of air flow through the six outlets, and the actual data in the table represent the deviation of the air flow at a particular outlet, expressed as a percentage of the mean flow through all six outlets for that particular test. Four tests were made with each duct for each velocity group.

A general inspection of the table indicates that the velocity of discharge from branch duct 6 (farthest from the fan) was always less

than the mean, except in the case of low velocities with the straight main duct. Branch 5 always showed a velocity lower than the mean. At branch 4 the velocity was generally very close to the mean, except with the lowest velocities in the case of the tapered main duct. At branches 2 and 3 the velocity was always above the mean. At branch 1 (nearest the fan) the velocity was markedly lower than the mean at low mean velocities and somewhat higher than the mean at high mean velocities.

TABLE I.—*Study of uniformity of distribution effected by tapered and untapered main ducts and slanting branch ducts. Deviation of observed velocity at each branch outlet in percentage of mean velocity at all outlets for the test in question.*

Branch.	Tapered duct: Deviation (percentage of mean velocity) in tapered duct, at mean velocity (feet per min.) of—				Untapered duct: Deviation (percentage of mean velocity) in untapered duct, at mean velocity (feet per min.) of—			
	400-600	800-1,000	1,100-1,400	1,500-1,800	400-600	800-1,000	1,100-1,400	1,500-1,800
Branch 1.....	-13.0	+5.8	+3.9	+4.3	-18.1	0.0	+2.0	+5.4
	-12.7	+5.5	+4.3	+4.6	-17.9	0.0	+2.1	+4.8
	-15.4	+4.4	+7.7	+7.4	-10.1	-3.4	+1.1	+2.1
	-16.7	+5.7	+13.7	+8.2	-12.2	0.0	+1.1	+2.0
Branch 2.....	+6.8	+5.5	+3.9	+2.9	+6.8	+4.6	+3.0	+4.0
	+6.8	+5.4	+3.7	+3.0	+6.8	+4.6	+3.1	+4.3
	+8.5	+6.6	+5.2	+4.5	+4.0	+4.9	+5.6	+5.1
	+9.0	+5.2	+4.5	+4.1	+4.0	+5.0	+6.5	+5.0
Branch 3.....	+7.6	+2.0	+1.7	+1.6	+10.1	+4.7	+3.4	+2.7
	+7.4	+2.4	+1.6	+2.2	+8.0	+4.4	+3.2	+2.9
	+7.9	+1.6	+0.6	+1.1	+7.7	+6.2	+7.2	+4.9
	+9.3	+1.1	-2.2	+0.4	+7.6	+6.6	+6.8	+6.1
Branch 4.....	+3.4	-0.7	+0.9	+0.9	-0.4	+2.5	-2.5	-3.7
	+3.8	-0.8	+1.1	+0.7	0.0	-2.1	-2.8	-3.1
	+2.3	-0.8	-0.6	-0.8	-0.2	-0.3	-2.1	-0.9
	+2.6	+1.9	-2.8	-0.5	+0.2	-1.1	-2.2	-1.0
Branch 5.....	-1.0	-4.0	-2.4	-2.6	-1.3	-5.1	-4.3	-5.8
	-1.8	-4.5	-3.0	-3.0	-0.5	-5.7	-4.2	-5.9
	-1.2	-4.0	-4.2	-4.1	-3.7	-5.4	-6.7	-7.1
	-1.2	-5.0	-5.0	-3.3	-1.8	-5.5	-7.0	-7.3
Branch 6.....	-3.8	-8.1	-7.7	-7.0	+2.4	-1.4	-1.4	-2.7
	-3.6	-7.8	-7.6	-7.3	+4.0	-1.2	-1.3	-2.9
	-2.8	-7.7	-8.7	-8.1	+2.8	-1.6	-5.1	-4.0
	-3.3	-8.8	-8.2	-9.0	+2.3	-3.1	-5.2	-4.8
Average percent deviation ¹	6.3	4.4	4.4	3.8	5.5	3.3	3.7	4.1.

¹ Disregarding sign.

In general, the distribution was more even with mean velocities over 800 feet per minute than with mean velocities under 600 feet. On the whole, however, the deviations were in most cases remarkably small. Disregarding sign, we find that out of 192 individual observations, 44 deviated by less than 2 per cent from the mean, 49 by 2-3.9 per cent, 50 by 4-5.9 per cent, 39 by 6-9.9 per cent, and only 10 by 10 to 20 per cent. Of the 10 highly aberrant observations, 8 were made at branch 1, where low mean velocities indicated the strong tendency for an air current of low velocity to pass this outlet.

Finally, on comparing the results obtained with the tapered and straight-sided ducts, respectively, it is evident that there is very little difference between them; but that what advantage exists is on the side of the untapered duct. Averaging the observations for all velocities we get an average deviation from the mean of 4.7 per cent for the tapered and 4.4 per cent for the untapered duct.

RESULTS OF AIR-SUPPLY STUDIES WITH LATERAL PORTS.

The second set of tests, 16 with the tapered and 16 with the untapered duct (including 192 velocity measurements), was conducted with the slanting branch ducts closed, so that the air emerged only from the 6 by 6 inch ports in the side and at the end of the main duct. The results are presented in Table II, on the same plan as that used in Table I.

It is obvious that with the tapered duct the change from slanting branch ducts to lateral ports has had a most disastrous effect upon the evenness of distribution. Results obtained with the untapered duct are slightly less satisfactory than those recorded in Table I, but for the tapered duct we find average deviations of about 23 per cent at all velocities.

With the slanting branch ducts the air passed out in excess through the branches near the fan, whereas a deficiency was manifest at the terminal end of the system. With lateral ports open, the untapered duct showed exactly the reverse relation, the ports near the fan having a minimum, and those at the far end a maximum discharge. The tapered duct, on the other hand, with lateral ports, showed the same general tendency manifest with the branch ducts to decreased flow as we pass away from the fan, but in much more marked degree, port E having a deficiency of over 60 per cent; whereas the terminal port (F) at the end of the duct and in the direct line of flow showed a marked excess.

With the tapered duct the velocity of air flow made little difference in the distribution, which was always highly uneven; but with the untapered duct the low velocities gave the poorest results.

TABLE II.—*Study of uniformity of distribution effected by tapered and untapered main ducts with plain portholes. Deviation of observed velocity at each port, in percentage of mean velocity at all outlets for the test in question.*

Port.	Tapered duct: Deviation (percentage of mean velocity) in tapered duct, at mean velocity (feet per min.) of—				Untapered duct: Deviation (percentage of mean velocity) in untapered duct, at mean velocity (feet per min.) of—			
	400-600	800-1,000	1,100-1,400	1,500-1,800	400-600	800-1,000	1,100-1,400	1,500-1,800
Port A.....	+10.2 +9.8 +8.9 +11.2	+11.6 +12.1 +14.4 +14.0	+11.0 +13.2 +9.8 +11.2	+11.9 +11.5 +11.0 +11.9	-12.5 -14.9 -14.0 -14.9	-10.9 -10.9 -8.8 -10.8	-9.7 -10.3 -10.7 -9.3	-9.4 -8.6 -9.0 -9.6
Port B.....	+11.6 +12.9 +13.3 +13.6	+13.6 +13.3 +12.6 +14.3	+11.9 +12.9 +13.0 +14.1	+11.9 +13.7 +12.9 +13.7	-4.0 -5.6 -5.1 -5.2	-5.6 -4.9 -5.1 -6.0	-4.8 -4.6 -5.2 -4.6	-5.0 -5.0 -4.6 -4.3
Port C.....	+6.7 +4.0 +5.5 +5.5	+4.2 +1.2 +4.5 +3.3	+2.7 +3.8 +5.3 +5.2	+5.4 +4.6 +2.7 +3.9	-2.4 -0.6 -1.3 -1.7	-0.4 -1.9 -1.7 -1.8	-1.0 -1.0 -0.8 -1.9	-1.9 -2.4 -2.3 -1.4
Port D.....	-3.7 -2.7 -2.7 -6.9	-5.9 -5.1 -7.0 -8.1	-5.8 -8.4 -5.0 -6.6	-4.7 -8.3 -4.5 -5.9	+3.2 +3.1 +2.6 +3.4	+2.1 +1.7 +2.6 +2.2	+0.8 +1.3 +3.0 +0.1	+2.4 +1.6 +1.9 +1.6
Port E.....	-62.2 -62.4 -62.6 -63.1	-61.6 -62.8 -63.1 -63.2	-61.3 -63.2 -62.7 -62.8	-67.3 -64.4 -61.4 -62.5	+5.3 +7.6 +6.5 +7.2	+4.9 +5.4 +4.5 +7.0	+4.7 +5.4 +4.2 +4.2	+5.9 +5.9 +5.1 +4.7
Port F.....	+37.2 +38.4 +37.6 +39.8	+40.2 +41.0 +38.7 +39.7	+41.8 +41.6 +39.6 +39.1	+42.8 +43.0 +41.4 +39.0	+10.3 +10.3 +11.3 +11.2	+9.8 +10.6 +8.4 +9.3	+10.0 +9.3 +9.5 +10.3	+8.0 +8.4 +8.9 +9.0
Average per cent deviation ¹	22.2	23.1	23.0	23.4	6.8	5.7	5.3	5.3

¹ Disregarding sign.

RESULTS OF AIR-EXHAUST STUDIES WITH SLANTING BRANCH DUCTS.

Table III presents the results of 40 tests (including 240 velocity measurements) made with the system operated on the exhaust plan, but with slanting branch ducts open and side ports on main ducts closed, as in the experiments of the first series.

Five velocity groups are represented, extending up to 2,500 feet per minute, as higher velocities commonly obtain in exhaust systems than in plenum systems. Otherwise the technique was the same as that described above.

As far as the distribution between the different branch ducts is concerned, branch duct 6 (farthest from the fan) here shows a consistent excess, probably because this branch duct, as indicated in the figure, opened at the end of the main duct in the direct line of air flow instead of slanting off at an angle from the side of the main duct. Branch duct 5 showed a velocity very close to the mean, and branch ducts 1, 2, and 4 were fairly close. Branch duct 3, curiously enough, generally showed a distinct deficiency in air flow.

Comparing different velocities, we find that the untapered duct agrees with the results obtained for both ducts under plenum con-

ditions in showing most marked deviation at the low velocities (under 600 feet). On the other hand, the tapered duct shows its most marked deviation under exhaust condition at high velocities.

As in the case of the plenum studies with slanting branch ducts, the deviations are, in most cases, remarkably small. Forty-nine measurements showed deviations of less than 2 per cent from the mean, 65 were between 2 and 3.9 per cent, 61 between 4 and 5.9 per cent, 42 between 6 and 9.9 per cent, and 23 between 10 and 20 per cent.

When we compare the tapered with the untapered duct, it appears that the tapered duct gave better results at mean velocities under 600 feet, whereas at all the higher velocities the untapered duct gave more even distribution.

Averaging the figures for all velocities, we find a grand average deviation from the mean of 5 per cent for the tapered duct and 4.5 per cent for the untapered duct. Still more significant is the fact that out of 23 deviations of 10 per cent and over, 20 were observed with the tapered duct (including all the observations made with this duct at branch 6—farthest from the fan), and only 3 (at branch ducts 3, 4, and 6, with low velocities) with the untapered duct.

TABLE III.—*Study of uniformity of exhaust effected by tapered and untapered main ducts with slanting branch ducts. Deviation of observed velocity at each branch outlet, in percentage of mean velocity at all outlets for the test in question.*

Branch.	Tapered duct: Deviation (percentage of mean velocity) in tapered duct, at mean velocity (feet per min.) of—					Untapered duct: Deviation (percentage of mean velocity) in untapered duct, at mean velocity (feet per min.) of—				
	400- 600	800- 1,000	1,100- 1,400	1,500- 1,800	2,300- 2,500	400- 600	800- 1,000	1,100- 1,400	1,600- 1,800	2,300- 2,500
Branch 1.....	0.0 -3.5 +4.2 -2.1	-4.7 -0.8 +1.5 -0.4	-0.2 -4.5 +0.4 -0.1	-2.9 -3.2 -2.7 +0.8	-2.8 -4.2 -3.0 -3.1	+6.8 +8.3 +6.3 +3.9	+2.7 +4.0 +5.6 +2.8	+3.7 +2.8 +3.7 +1.9	+0.5 +2.5 +4.6 +3.6	+2.0 +2.0 +3.5 +1.7
Branch 2.....	-3.4 -4.6 +0.9 -4.0	-3.4 -5.0 -2.7 -2.5	-2.4 -4.0 -4.7 -3.3	-3.0 -3.3 -4.3 -4.2	-4.3 -3.7 -6.1 -5.3	-3.9 -6.8 -1.8 -6.7	-3.7 -3.8 -2.2 -4.9	-3.2 -2.8 -3.8 -4.1	-4.4 -3.2 -4.4 -5.0	-3.9 -3.4 -4.5 -3.2
Branch 3.....	-6.5 -1.2 -6.3 -6.1	-6.4 -6.9 -6.2 -6.1	-4.7 -5.7 -5.7 -5.0	-6.0 -6.4 -4.8 -5.4	-6.5 -6.6 -6.0 -6.2	-2.7 -5.4 -10.4 -9.7	-7.3 -6.2 -3.7 -5.8	-5.9 -6.4 -4.1 -4.6	-3.4 -5.4 -6.3 -6.9	-3.7 -4.4 -4.5 -4.0
Branch 4.....	-3.7 +0.6 -5.5 -0.9	-1.9 -1.8 -4.7 -3.2	-4.4 -2.1 -4.1 -5.0	-2.3 -2.2 -3.3 -4.3	-1.4 -2.9 -1.8 -2.4	-6.1 -4.6 -5.5 +11.0	-4.0 -2.2 -5.5 -5.1	-5.1 -3.2 -0.6 -4.3	-3.1 -3.7 -4.5 -3.4	-4.6 -4.8 -3.6 -3.6
Branch 5.....	+0.3 -1.6 -5.8 +0.2	+1.6 -1.0 -1.6 +0.1	-1.4 +1.2 +2.3 -0.5	-0.4 -0.3 -1.4 -1.5	-0.6 +1.1 +0.3 +0.6	-1.3 -0.3 +4.0 -2.3	+4.3 +0.8 +1.2 +2.5	+2.0 -0.1 +2.9 +2.4	+1.5 +0.3 +2.3 +4.0	+2.0 -1.4 +0.8 +1.6
Branch 6.....	+13.3 +10.0 +11.6 +12.9	+14.8 +15.5 +13.7 +12.2	+13.1 +14.8 +11.9 +13.9	+13.7 +15.2 +16.6 +14.5	+15.6 +16.2 +16.6 +16.4	+7.6 +8.7 +7.5 +3.7	+7.9 +7.5 +6.5 +10.6	+8.5 +9.7 +7.5 +8.6	+3.3 +9.5 +8.3 +7.7	+8.2 +5.2 +8.3 +7.5
Average per cent deviation ¹	4.6	4.9	4.8	5.1	5.6	5.6	4.7	4.2	4.2	2.8

¹ Disregarding sign.

RESULTS OF AIR EXHAUST STUDIES WITH LATERAL PORTS.

Finally, a series of tests was made of exhaust ventilation with lateral ports and no branch ducts, including 24 tests and 144 velocity measurements, the extreme range of velocities being the same used in the third series, with two of the intermediate velocity groups omitted.

Again the substitution of lateral ports for slanting branch ducts proved highly detrimental to the evenness of distribution, particularly with the tapered duct.

In all cases the ports nearest the fan showed a markedly excessive air flow and those at a distance from the fan a marked deficiency. Port F (at the end of the duct in the direct line of air flow) exhibited the most striking deficiency with the tapered duct, but gave a value near the mean with the untapered duct.

The velocity of air flow showed little influence upon the evenness of distribution in the case of the tapered duct, but with the untapered duct the results were least satisfactory at low velocities.

TABLE IV.—*Study of uniformity of exhaust effected by tapered and untapered main ducts with plain portholes. Deviation of observed velocity at each port, in percentage of mean velocity at all outlets for the test in question.*

Port.	Tapered duct: Deviation (percentage of mean velocity) in tapered duct, at mean velocity (feet per min.) of—			Untapered duct: Deviation (percentage of mean velocity) in untapered duct, at mean velocity (feet per min.) of—		
	400-600	1, 100-1, 400	2, 300-2, 500	400-600	1, 100-1, 400	2, 200-2, 500
Port A.....	+52.8 +51.1 +50.8 +50.2	+47.0 +47.6 +48.4 +48.6	+51.7 +49.3 +49.1 +50.5	+20.2 +20.5 +23.4 +19.8	+18.0 +20.2 +19.4 +18.1	+18.7 +19.1 +20.8 +18.7
Port B.....	+37.1 +35.9 +34.2 +36.4	+35.4 +38.1 +35.8 +31.0	+37.0 +35.4 +40.0 +35.0	+7.9 +8.0 +9.8 +7.2	+5.6 +5.8 +5.9 +4.8	+5.0 +5.6 +5.0 +4.0
Port C.....	+21.6 +19.3 +21.0 +19.3	+21.2 +19.5 +21.8 +19.2	+19.1 +22.6 +19.2 +20.4	-4.0 -0.4 -1.0 -2.2	-0.3 +0.4 -2.4 -2.9	-0.8 -1.4 -2.0 -2.7
Port D.....	-2.4 -0.5 -0.2 -2.0	+1.6 -0.3 +1.8 -1.0	-1.3 -1.3 -1.3 -0.1	-13.2 -12.2 -14.5 -9.3	-10.6 -11.1 -8.5 -8.1	-8.5 -9.3 -10.2 -9.2
Port E.....	-49.5 -48.0 -47.6 -47.6	-49.1 -48.8 -50.0 -46.7	-50.9 -49.5 -50.9 -50.7	-14.3 -17.3 -16.5 -13.3	-12.5 -15.9 -12.8 -11.9	-12.4 -14.3 -12.9 -13.5
Port F.....	-59.5 -57.9 -58.2 -56.1	-55.9 -56.2 -57.8 -58.6	-55.6 -56.4 -56.0 -55.2	+2.5 +1.3 -1.1 -2.2	-0.2 -0.5 -1.7 -0.1	-1.0 -3.2 -0.5 +1.7
Average per cent deviation ¹ .	35.8	35.0	35.8	10.1	8.2	8.4

¹ Disregarding sign.

GENERAL CONCLUSIONS.

In Table V we have summarized the main results obtained, arranging the averages for the four series of tests with tapered and untapered duct in order, with the tests showing best results at the top and those with more uneven distribution in regressive order downward. The general conclusions to be drawn from this study are brought out in the clearest fashion by an inspection of this table.

TABLE V.—*General results in regard to evenness of distribution in all tests—Average per cent deviation, disregarding sign.*

Type of ventilation.	Type of duct.	Type of outlet.	Velocity (feet per minute).					All velocities.
			400-600	800-1,000	1,100-1,400	1,500-1,800	2,300-2,500	
Plenum.....	Untapered.....	Branch ducts...	5.5	3.3	3.7	4.1	.....	4.4
Exhaust.....	do.....	do.....	5.6	4.7	4.2	4.2	3.8	4.5
Plenum.....	Tapered.....	do.....	6.3	4.4	4.4	3.8	.....	4.7
Exhaust.....	do.....	do.....	4.6	4.9	4.8	5.1	5.6	5.0
Plenum.....	Untapered.....	Lateral ports....	6.8	5.7	5.3	5.3	.....	5.8
Exhaust.....	do.....	do.....	10.1	.....	8.2	.....	8.4	8.9
Plenum.....	Tapered.....	do.....	22.2	23.1	23.0	23.4	.....	22.9
Exhaust.....	do.....	do.....	35.8	.....	35.0	.....	35.8	35.5

It will be noted that without a single exception—

- (a) Branch ducts give better results than lateral ports;
- (b) With either branch ducts or lateral ports, an untapered main duct gives better results than a tapered one;
- (c) Other conditions being equal, plenum ventilation is more even than exhaust ventilation.

The most important factor, as the English departmental report pointed out, is the use of slanting branch ducts for the exhaust or discharge of air into or from the main duct. Where such lateral branches are provided the shape of the main duct makes little difference, as in all the tests made with such branches in operation we obtained results showing an average deviation of less than 5 per cent.

If lateral branch ducts are not provided, on the other hand, the design of the main duct becomes of compelling importance. A tapered main duct with lateral ports gives a distribution so markedly uneven as to detract in a serious measure from its efficiency, whereas the lateral port system, though never as good as one which involves the use of branch ducts, may yield results which are fairly satisfactory if the main duct is untapered.

In conclusion, then, it may be stated:

1. That in order to secure the most even distribution, ventilating systems, on either the plenum or the exhaust plan, should be constructed with slanting branch ducts, the question whether the main duct should be tapered or untapered being decided by the relative cost of labor and materials involved.

2. That reasonably good distribution can be economically effected with an untapered duct discharging or exhausting through lateral ports.

3. That a tapered duct discharging or exhausting through lateral ports is likely to give rise to serious irregularity in distribution.

COURT DECISION REGARDING PERSONAL ATTENDANCE ON PATIENTS BY PRACTITIONERS UNDER HARRISON ANTI-NARCOTIC ACT.¹

In a prosecution for violation of the Harrison Antinarcotic Act, the evidence showed that the defendant, a physician, dispensed at his office some morphine to a certain person. The defendant claimed that what he did he had a right to do as a practicing physician. The law provides for the dispensing, without an order form, of drugs to a patient by a physician in the course of his professional practice, and no record is required to be kept of drugs dispensed to a patient upon whom a physician shall personally attend. Under the authority conferred by the law, the Commissioner of Internal Revenue promulgated a rule regarding dispensing of drugs by practitioners which provided in part that "A practitioner is not regarded as in personal attendance upon a patient within the intent of the statute unless he is in personal attendance upon such patient away from his office." In reversing the judgment of conviction and granting a new trial, the United States Circuit Court of Appeals, Eighth Circuit, said: "The power of the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, to make all needful rules and regulations for carrying the provisions of the Narcotic Act into effect, did not confer the power to say that a physician could not personally attend a patient at his office. The enforcement of the act did not require any such rule, and it is contrary to the language of the act itself, which is plain and unambiguous and says nothing about where the patient shall be when personally attended. * * * If Congress had intended to exclude personal attendance at office, it would have said so. * * * The fact of omission is strong evidence that it did not intend to say so. * * * Congress can not delegate legislative power to an executive officer."

DEATHS DURING WEEK ENDED JULY 15, 1922.

Summary of information received by telegraph from industrial insurance companies for week ended July 15, 1922, and corresponding week, 1921. (From the Weekly Health Index, July 18, 1922, issued by the Bureau of the Census, Department of Commerce.)

	Week ended July 15, 1922.	Corresponding week, 1921.
Policies in force	49, 659, 725	47, 327, 101
Number of death claims	8, 616	8, 159
Death claims per 1,000 policies in force, annual rate	9.0	9.0

¹Hurwitz v. United States, 280 Fed. 109.